WE CLAIM:

1. A packaged micromechanical device comprising:

a semiconductor chip having an integrated circuit including a plurality of micromechanical components configured in a plane in the central portion of said chip, and a plurality of metallic terminals disposed in peripheral portions, surrounding said chip;

an electrically insulting substrate having first and second surfaces and an opening, said surfaces being substantially parallel to each other;

a plurality of electrically conductive routing lines integral with said substrate;

a first plurality of metallic contact pads disposed on said first surface, in proximity to said opening and electrically connected with said routing lines;

a second plurality of metallic contact pads disposed on said first surface, remote from said opening and electrically connected with said routing lines;

a plurality of solder balls electrically connecting said terminals to said first plurality of contact pads, mounting said chip onto said substrate spaced apart by a gap, whereby one level of said opening is closed, and positioning said substrate in a plane parallel to said components plane;

a polymer encapsulant filling said gap, surrounding said opening with a continuous frame of polymer; and

a lid adhered to said second surface in a plane

parallel to said components plane, whereby a second level of said opening is closed.

2. The packaged device according to Claim 1 wherein said micromechanical device is a digital micromirror device.

3. The packaged device according to Claim 1 wherein said micromechanical components are micromirrors.

4. The packaged device according to Claim 1 wherein said insulating substrate is made of ceramic having a single level metallization.

5. The packaged device according to Claim 4 wherein said single level metallization is structured into said conductive routing lines and said first and second pluralities of contact pads.

6. The packaged device according to Claim 1 further comprising ridge-like protrusions formed by said ceramic substrate and positioned under said lid, suitable for storing chemical compounds.

7. The packaged device according to Claim 6 wherein said chemical compounds are formed as a pill or granular material suitable for releasing passivants continuously to coat contacting surfaces of said micromechanical components.

8. The packaged device according to Claim 1 wherein said solder balls are selected from a group consisting of lead/tin, indium, tin/indium, tin/silver, tin/bismuth, solder paste, conductive adhesives, and solder-coated spheres.

9. The packaged device according to Claim 1 wherein said polymer encapsulant comprises an epoxy-based material filled with silica and anhydrides.

10. The packaged device according to Claim 1 wherein said

lid is a plate made of glass or any other material transparent to light in the visible range of the electromagnetic spectrum.

11. The packaged device according to Claim 1 wherein said lid is adhered to said second substrate surface by an epoxy adhesive.

12. The packaged device according to Claim 1 further having a plurality of solder balls disposed on said second plurality of contact pads.

13. A method of fabricating land-grid array devices for semiconductor chips having an integrated circuit including a plurality of micromechanical components configured in a plane in the central portion of said chip and a plurality of metallic terminals disposed in peripheral portions encircling said chip, comprising:

providing a wafer having a surface including a plurality of said chips;

coating said wafer surface with a protective material;

selectively etching said protective coating, exposing said terminals of each of said chips;

depositing one solder ball on each of said exposed terminals;

separating the resulting composite structure into discrete chips;

providing an electrically insulating substrate having first and second surfaces and an opening, said surfaces being substantially parallel to each other, a first plurality of metallic contact pads disposed on said first surface in proximity to said opening, and a second plurality of metallic contact pads disposed on said first

surface remote from said opening;

mounting one of said discrete chips on said first plurality of substrate contact pads by forming solder joints, spaced apart by a gap;

controlling the height of said solder joints to maintain uniformity, thereby positioning said substrate in a plane parallel to said components plane;

filling said gap with a polymeric encapsulant, surrounding said opening by a continuous frame of encapsulant;

removing said protective material, thereby exposing the surfaces of said components; and

attaching a lid to said second substrate surface, thereby positioning said lid in a plane parallel to said plane of said components.

14. The method according to Claim 13 wherein said steps of mounting, controlling and filling comprise the steps of:

aligning one of said discrete chips having said solder balls with said first plurality of substrate contact pads so that each of said balls is placed into alignment with one of said contact pads;

contacting said balls and said contact pads;

supplying thermal energy to said chip and said substrate, whereby said solder is reflowed to form solder joints and said chip is mounted to said substrate spaced apart by a gap, forming an assembly;

controlling the height of said solder joints to maintain uniformity, thereby positioning said

substrate in a plane parallel to said components plane;

cooling said assembly from the reflow temperature to a temperature still elevated above ambient temperature and maintaining said elevated temperature at a substantially constant level;

filling said gap with a polymeric precursor at said elevated temperature, thereby surrounding said opening by a continuous frame of precursor;

supplying additional thermal energy for curing said polymeric precursor, thereby forming a polymeric encapsulant; and

cooling said assembly to ambient temperature.

15. The method according to Claim 14 wherein said elevated temperature is between 90 and 130 °C.

16. The method according to Claim 14 wherein said elevated temperature is approximately 100 °C.

17. The method according to Claim 13 wherein said step of controlling the height of said solder joints comprises the steps of:

applying radiant energy to reach a liquid state of said solder balls;

contacting the smallest ball;

dwelling for metallurgical interaction;

establishing desired connection height; and

removing said radiant energy.

18. The method according to Claim 13 further comprising the step of disposing a plurality of solder balls onto said second plurality of contact pads, thereby transforming said land-grid array device into a ball-grid array device.

19. The method according to Claim 13 further comprising the

step of depositing chemical compounds before attaching said lid to said second substrate surface.

20. The method according to Claim 13 wherein said protective material is a layer of photoresist material as used in semiconductor photolithographic processes.

21. The method according to Claim 13 wherein said step of selectively etching comprises the steps of masking, exposing and selective etching in accordance with the characteristics of said photoresist material employed.

22. The method according to Claim 13 wherein said step of separating said composite structure comprises sawing.

23. The method according to Claim 13 wherein said step of removing said protective material comprises dissolving said layer of photoresist material.